Medium optimisation of chitinase enzyme production from shrimp waste using Bacillus licheniformis TH-1 by response surface methods

ABSTRACT

The optimization of fermentation medium for the production of chitinase by Bacillus licheniformis TH-1 was carried out using Response Surface Methodology (RSM) based on the two level factorial design. This procedure limited the number of actual experiments performed while allowing for possible interactions between 5 components. RSM was adopted to derive a statistical model for the effect of chitin, Yeast Extract (YE), peptone, NaNO3 and K2HPO4 on chitinase production. The p-value of the coefficient for linear effects of chitin, peptone and YE was 0.0001, suggesting that this was the principal experiment variable, having the greatest effect on the production of chitinase. The optimal combinations of media constituent for maximum chitinase production are determined as 10 g L-1 chitin, 0.5 g L-1 YE, 0.5 g L-1 peptone, 2.55 g L-1 NaNO3 and 1.55 g L-1 K2HPO4. The optimization of the fermentation medium resulted not only in a 5.4 fold increase of enzyme activity compared to unoptimized medium but also a reduced amount of the required medium constituents. The response surface analysis provided a useful tool for the optimization of a low cost enzyme producing medium for potential use on an industrial scale.

Keyword: Chitinase; NAG; Response surface methodology